



Connecting Industry to Mathematics Instruction

NSF ATE Award # 1954291

Pareto Analysis in Quality Improvement Student Activity Sheet

Today you will learn how to create a Pareto chart in Excel. The Pareto principle states that, for many events, roughly 80% of the effects come from 20% of the causes. In this example, we will see that roughly 80% of the complaints come from 20% of the complaint types.

When do we use a Pareto Chart?

- When analyzing data about the frequency of problems or causes in a process.
- When there are many problems or causes and you want to focus on the most significant.
- When analyzing broad causes by looking at their specific components.
- When communicating with others about your data.

How do we create a Pareto Chart?

- Step 1: Organize the categorical data in descending order.
- Step 2: Compute the percent distribution for each category.
- Step 3: Compute the cumulative percent distribution for each category.
- Step 4: Create a Pareto Graph using Excel
- Step 5: Analyze data to make recommendations for change

Task 1: Cafeteria Example

The school system is planning the operating budget and looking for ways to optimize spending. The cafeteria sales have been on a steady decline for several years, thus making it difficult to justify an increase in budget. Each year, more students are eating off campus. A small team has been put together to research ways to increase sales and profitability. The team surveyed students to understand why they are not eating in the cafeteria. The team has 6 months to demonstrate an increase in sales, so a bigger budget can be justified. The results of the survey have been compiled into categories and listed on the student spreadsheet.

Using the student spreadsheet provided by your teacher, create a Pareto Chart and answer the following questions.

1. Where is the numerical turn in the data that separates the vital few from the trivial many?
2. What issues will have the most impact toward improvement?
3. What is the amount of the top percentage you will focus your energy on?

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4. What possible recommendations do you have for management regarding your survey results?
5. What risk or uncertainties exist? What things are in your control to fix and what is out your control?
6. What other factors are important to consider?

Task 2: Low Student Performance

Students at Aiming High Academy have the lowest grades in the district. This will result in funding cuts, if the performance does not improve significantly over the next year. A diverse team of student leaders and teachers was compiled to research the issue. The team surveyed 100 students with consistent below-average performance over the past 2 years. Where should the team focus to drive improvement in these students?

Using the student spreadsheet provided by your teacher, create a Pareto Chart and answer the following questions.

1. Where is the numerical turn in the data that separates the vital few from the trivial many?
2. What issues will have the most impact toward improvement?
3. What is the amount of the top percentage you will focus your energy on?
4. What possible recommendations do you have for management regarding your survey results?
5. What risk or uncertainties exist? What things are in your control to fix and what is out your control?
6. What other factors are important to consider?
7. Do you think students would have trouble identifying their own reason for low performance? Why or why not?
8. Are there any categories that you think overlap, could be combined, or should be separated into more specific categories?

Task 3: Dodge RAM 2500

Using the customer information on the student spreadsheet, determine the categories of mechanical issues and complete the chart. Create your Pareto chart by highlighting the correct columns in the above chart.

Answer the following questions

1. Where is the numerical turn in the data that separates the vital few from the trivial many?
2. What issues will have the most impact toward improvement?

3. What is the amount of the top percentage you will focus your energy on?
4. What possible recommendations do you have for management regarding your survey results?
5. What risk or uncertainties exist? What are things that you as the manufacturer cannot control and what can you control?
6. What other factors are important to consider?

Task 4: In your groups of 3-4, you are going to determine some process in society that is not working as well as it should and then create a survey to look for issues.

Follow the instructions on the student spreadsheet pages titled Team Survey, Team Pareto, Team Recommendations to complete this task.